L 01238-67

ACC NR: AT6031142

degradation process. The investigation showed that regeneration through hydrogeneration-degradation considerably decreases radiolytic losses in the coolant. The principal parameters for the regeneration of hydrostabilized gas oils are given and the useful life of the aluminocobalt molybdenum catalyst under adopted operating parameters is determined. Orig. art. has: 8 figures and 5 tables. [SP]

SUB CODE: 20/ SUBM DATE: none/

L 01238-67 FWT(m) JR

ACC NR: AT6031142 SOURCE CODE: UR/3136/66/000/066/0001/0024

AUTHOR: Aleksenko, Yu. N.; Brodskiy, A. M.; Zabelin, A. I.; Kevrolev, V. P.; Lavrovskiy, K. P.; Makarov, D. V.; Tetyukov, V. D.; Fish, Yu. L. 42 B+1

ORG: none

TITLE: Analysis of tests of a unit for the atomic power station "Arbus" for regenerating a gas oil coolant by degeneration hydrogenation 19

SOURCE: Moscow. Institut atomnoy energii. Doklady, IAE-1066, 1966. Analiz ispytaniy ustanovki destruktivno-gidrogenizatsionnoy regeneratsii gazoylevogo teplonositelya AES Arbus, 1-24

TOPIC TAGS: organic moderated reactor, organic coolant, atomic energy, atomic power station, organic cooled nuclear reactor, catalyst, catalyst regeneration/Arbus-I atomic power station

ABSTRACT: An analysis is made of data obtained in the experimental operation of the "Arbus-I" atomic power station and related laboratory studies. The "Arbus-I" differs from other atomic power stations using organic-cooled and-organic-moderated reactors in that its gas oil coolant is regenerated by means of a hydrogenation-

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031500051-6

L 16729-65

ACCESSION NR: AP5007899

fraction. It is shown that regeneration by hydrogenation enables one to maintain the prescribed amount of polymers and unsaturated compounds in the working heat-transfer agent within wide limits. It is also shown that the unsaturated compounds are completely eliminated during the process of regeneration and that the concentration of the products of radiation polymerization is greatly reduced. The authors conclude that the material balance during the regeneration of hydrogenated terphenyls does not differ from the balance during regeneration of a gas-oil fraction with respect to either hydrogen consumption or the yield of end products. Orig. art. has: 4 tables and 3 figures.

ASSOCIATION: Institut atomnoy energii, Moscow (Institute of Atomic Energy)

SUBMITTED: 01Aug64 ENCL: 00 SUB CODE: TD,OC,NP

NO REF SOV: 000 OTHER: 000

Card 2/2

[illegible] EWP(j)/EWA(1)/EWP(t) Pc-4/Pr-4/Ps-4/Pu-4/Pab-4 RM/DJ/GS

ACCESSION NR: AT5007599 S/0000/64/000/000/0056/0062

58
57
B+1

AUTHOR: Brodskiy, A. M.; Lavrovskiy, K. P.; Makarov, D. V.; Fish, Yu. L.; Zvonov, N. V.

TITLE: The regeneration of organic heat-transfer agents by hydrogenation

SOURCE: Moscow. Institut atomnoy energii. Issledovaniya po primeneniyu organicheskikh teplonositeley-zamedliteley v energeticheskikh reaktorakh (Research on the use of organic heat-transfer agents and moderators in power reactors). Moscow, Atomizdat, 1964, 56-62

TOPIC TAGS: organic reactor coolant, thermal reactor, power reactor, radiation polymerization, heat transfer agent, coolant regeneration, coolant hydrogenation, catalytic hydrogenation

ABSTRACT: The results of model tests on the use of gas-oil and hydroterphenyl as heat-transfer agents are presented. The regeneration of the heat-transfer agents was carried out under conditions of hydrocracking on an Al-Co-Mo catalyst under a hydrogen pressure of 40 - 60 atm. at a temperature of 300 - 350C in the reactor. The changes in the content of polymers and unsaturated compounds as a function of the dose of absorbed energy were determined during radiolysis of the gas-oil

Card 1/2

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031500051-6

BRODSKIY, A.M.; LABROVSKIY, K.P.; MAKAROV, D.V.; MEZENTSEV, A.N.; FISH, Yu.L.

Radiation-thermal cracking of gas oil. Neftekhimiia 2 no.3: 332-338 My-Je '62. (MIRA 15:8)

1. Institut neftekhimicheskogo sinteza AN SSSR.
(Cracking process) (Petroleum products)

PAVLOVSKIY, M.M.; MAKAROV, D.V.

Refining highly unsaturated gasoline with activated aluminum oxide. Zhur. prikl. khim. 34 no.5:1107-1110 My '61. (MIRA 16:8)

(Aluminum oxide) (Gasoline)

LAVROSKIY, K.P.; MAKAROV, D.V.; FISH, Yu.L.

Two-stage hydrogenation of commercial benzene in the presence of mixed catalysts. Neftekhimiia 1 no.4:509-513 Jl-Ag '61. (MIRA 16:11)

1. Institut neftekhimicheskogo sinteza AN SSSR.

MAKAROV, D.V., FISH, Yu.L.

Two-stage hydrogenation of highly aromatized sulfur-bearing distillates. Trudy Inst.nefti 13:256-261 '59. (MIRA 13:12)
(Petroleum--Refining)

MAKAROV, D.V.; NAZAROVA, L.M.

Autofining process of mixed fractions. Trudy Inst.nefti 13:250-255 '59. (MIRA 13:12)

(Petroleum--Refining)

PAVLOVSKIY, M.M.; MAKAROV, D.V.

Refining of highly unsaturated distillates over aluminosilicate catalysts. Trudy Inst.nefti 13:241-249 '59. (MIRA 13:12)
(Gasoline)

USSR/Chemical Technology. Chemical Products and Their Application--Treatment of natural gases and petroleum. Motor fuels. Lubricants. I-14

Abs Jour: Ref Zhur-Khimiya, No 3, 1957, 9308

Abstract: to distillation; a residue boiling above 470° (7.8% of the residual oil charge) and containing 23.5% asphaltenes is separated. A broad cut (boiling below 470°), containing no asphaltenes, is sent through a second hydrogenation treatment over a highly active fixed bed catalyst (WoS_2) at 390-400° and 200 atm; the throughput of the second stage is 2.0 kg/liter/hour with a recycle coefficient of 1.08. No poisoning of the catalyst is observed and the yield of hydrogenate (d_4^{20} 0.7995, gasoline of bp below 200° 43,5%, gas oil of bp 200-340° 46.5%, aromatic hydrocarbons 22.5%, naphthenic paraffins 77.5%, S 0%) is 97%. The application of combined deep-seated hydrogenation to petroleum distillation residues rich in asphaltenes and resins makes possible a marked increase

Card 2/3

MAKAROV, D.V.

USSR/Chemical Technology. Chemical Products and Their Application--Treatment of natural gases and petroleum. Motor fuels. Lubricants. I-14

Abs Jour: Ref Zhur-Khimiya, No 3, 1957, 9308

Author : Lavrovskiy, K. P., Makarov, D. V., and Nazarova, L.M.
Inst : Petroleum Institute of the Academy of Sciences USSR
Title : The Combined Deep-Seated Hydrogenation Method

Orig Pub: Tr. In-ta nefti AN SSSR, 1956, Vol 8, 145-154

Abstract: The combined deep-seated hydrogenation of residual oils from Romashkin crude has been investigated in pilot plant installations of the continuous type. The charge stock (d_4^{20} 0.965, 10.3% boiling below 350°, 17.8% boiling between 350 and 400°) is mixed with 2% carbon-base Fe-catalyst and subjected to a single-pass hydrogenation in a tubular reactor at 470° and 350 atm; the reactor throughput is 2.5 kg/liter/hour. A contact time of 3 min is used. The hydrogenate obtained in 90% yields is subjected

Card 1/3

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031500051-6

BOGOYAVLENSKIY, M.S.; VASHCHENKO, A.I.; DENISOV, A.N.; ZHETVIN, A.N.; ZEN'KOVSKIY, A.G.; MAKAROV, D.M.; MAKSIMOV, B.M.; FILATOVA, A.I.; SHABUNIN, Ye.M.

Oxidation and decarburizing of certain steels in duo-muffle furnaces of nonoxidizing heating. Stal' 23 no.12:1124-1126 D '63. (MIRA 17:2)

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031500051-6

DEMIN, G.I.; PLUZHNIKOV, A.I.; CHURAKOV, A.M., inzh.; ZHILIN, I.S., inzh.; MAKAROV, D.M., inzh.; LEBEDEV, N.D., inzh.; SHISHLOV, D.D., inzh.; IGLIN, V.P., inzh.; YEVLAYEV, E.S., laborant; KISELEV, V.V., laborant; KOTEL'NIKOV, V.V., laborant; TYULENEVA, N.I., laborant

Transfer of a holding furnace to heating by natural gas with self-carburation. Stal' 23 no.8:755-758 Ag '63. (MIRA 16:9)

1. Moskovskiy institut stali i splavov (for Demin, Pluzhnikov).
(Furnaces, Heating)

MAKAROV, D.I.; GOL'DBERG, A.S.; GESKIN, E.S.; GIL'MAN, S.M.; KRAVCHENKO, A.Ya.; GAMBAROV, V.I.

Simple control of air flow. Avtom. i prib. no.1:24-26 Ja-Mr '63. (MIRA 16:3)

1. Ukrainskiy gosudarstvennyy proyektnyy institut "Metallurgavtomatika" (for all except Kravchenko, Gambarov). 2. Metallurgicheskiy zavod imeni Petrovskogo (for Kravchenko, Gambarov).
(Open-hearth furnaces) (Electronic control)

L 46848-66

ACC NR: AT6024974

which the deposition potentials of the Cs-K pair differ by 0.04 V, the separation factor is only 4.25. This shows that under the conditions studied, the separation of alkali metals by electrolysis is very difficult, and a more complete separation can be achieved only in a multistage cascade process. Orig. art. has: 3 figures and 1 table.

SUB CODE: 07/11/ SUBM DATE: 04Feb64/ ORIG REF: 002/ OTH REF: 005

Card 2/2 blg

L 46848-66 EWT(m)/EWP(t)/ETI IJP(c) JD/JG/GD

ACC NR: AT6024974 (N) SOURCE CODE: UR/0000/65/000/000/0198/0204

AUTHOR: Shvedov, V. P.; Makarov, D. F.

ORG: none

TITLE: Study of the separation of K from Rb, K from Na, K from Cs, Rb from Na, Rb from Cs, and Na from Cs

SOURCE: AN SSSR. Otdeleniye obshchey i tekhnicheskoy khimii. Zashchitnyye metallicheskiye i oksidnyye pokrytiya, korroziya metallov i issledovaniya v oblasti elektrokhimii (Protective metallic and oxide coatings, corrosion of metals, and studies in electrochemistry). Moscow, Nauka, 1965, 198-204

TOPIC TAGS: potassium, rubidium, cesium, sodium, carbonate, electrolysis

ABSTRACT: The potentials of deposition of alkali metals on mercury from 0.1 N aqueous solutions of their carbonates were determined: Cs, -2.022 V; Na, -2.030 V; Rb, -2.054 V; K, -2.060 V. The dependence of the transfer of alkali metals into mercury on the cathode potential was established; from this dependence, the half-wave potentials of alkali metals were obtained: Cs, -2.096 V; Na, -2.104 V; Rb, -2.122 V; K, -2.138 V. The separation factors of a series of alkali metal pairs (Rb and K, Na and K, Cs and K, Na and Rb, Cs and Rb, Na and Cs) on a mercury cathode were determined for the electrolysis of 0.1 N aqueous solutions of carbonates of these metals at a constant cathode potential. These factors were found to be small: even in the most favorable case, in

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031500051-6

SHVEDOV, V.P.; MAKAROV, D.F.

Separation of Li and K, Li and Cs. Zhur. prikl. khim. 38 no.4: 756-760 Ap '65. (MIRA 18:6)

L 51542-65
ACCESSION NR: AP5011810

and 100.0% in the separation of Li and K. The large yield of iodine at the anode as compared to the yields of Cs and K which passed into the amalgam is apparently due to the fact that a partial evolution of hydrogen on mercury during the electrolysis and particularly at its end causes the evolution of an equivalent amount of iodine at the anode, together with an increase to 8-9 in the pH of the solution. Orig. art. has: 7 figures.

ASSOCIATION: none

SUBMITTED: 10Dec63 ENCL: 00 SUB CODE: MM, GC

NO REF SOV: 000 OTHER: 009

Card 2/2

L 51842-65 EPT(m)/EPF(n)-2/EWP(t)/EWP(b) Pu-4 IJP(c) JD/JG

ACCESSION NR: AP5011916 UR/0080/65/038/004/0756/0760
546.49+621.3.035.222+621.357.9+546.34+546.3?+546.36

AUTHOR: Shvadov, V. P.; Makarov, D. F.

40
39
B

TITLE: Separation of Li from K and Li from Cs

SOURCE: Zhurnal prikladnoy khimii, v. 38, no. 4, 1965, 756-760

TOPIC TAGS: electrolysis, electrolytic extraction, lithium, potassium, cesium

ABSTRACT: The object of the work was to separate alkali metals at the mercury cathode during controlled cathode-potential electrolysis of their halides. The deposition potentials of Li, K, and Cs on the mercury cathode were determined in an electrolysis cell consisting of a modified Hildebrand cell, in which the cathode potential was kept constant automatically by means of a potentiostat. In 0.1 N solutions of LiI, KI, and CsI, the deposition potentials were -2.26 V for Li, -2.06 V for K, and -2.02 V for Cs. Li and Cs were separated at a cathode potential of -2.08 V, and Li and K were separated at -2.10 V. The recovery of Cs in the amalgam was 86.0%, as determined by titration of CsOH; the yield of I, determined from the increase in the weight of the anode, was 95.0%. These yields were respectively 93.0%

Card 1/2

chem A MAKAROV, D.A 15

Effect of low temperatures on the hydration of soils D. A. Makarov (Chuvash Agr. Inst., Cheboksary). *Kolloid. Zhur.* **13**, 298-300(1951).—It has been shown (*Pochvovedenie* **3**, 178(1947)) that soils first frozen at temp. T and then heated lost most H_2O during heating if T was $-50°$. After freezing and thawing pH of soils increased, and the max. increase took place after $T = -50°$. Now the effect of T on the elec. cond. κ of soil suspensions was detd. A chernozem had κ of 8.0-8.9 $\times 10^{-4}$ ohm^{-1} cm.$^{-1}$ before freezing, 11.1-11.2 after $T = 0°$, 12.5-12.8 after $T = -50°$, and 10.8-11.0 after $T = -100°$. A similar max. of κ after $T = -50°$ was observed also for a forest-prairie soil and a podzol soil. Chernozem and podzol suspensions were more rapidly coagulated after freezing and thawing than before; $FeCl_3$, $CaCl_2$, HCl, and KCl were used as coagulants. The amt. of "bound" water was max. after freezing at $-50°$. J. J. Bikerman

1951

MAKAROV, D. A. PA-2T73

USSR/Soil Studies Mar 1947

"Temperature Optima of Soil Hydration," D A Makarov, 5 pp

"Pochvovedenie" No 3

The author concludes that low temperatures increase the degree of soil hydration in suspensions after thawing, and that this increase varies at different temperatures. The temperature optima lies between: -20°C to -76°C7 with maximum soil hydration at -50°C.

2T73

STATNIKOV, S. (Rustavi, Gruzinskaya SSR); MAKAROV, D. (Volzhskiy, Volgogradskaya oblast')

New cities. Zdorov'e 8 no.12:7-8 D '62. (MIRA 16:1)
(RUSTAVI--PUBLIC HEALTH)
(VOLZHSKIY (VOLGOGRAD PROVINCE)--PUBLIC HEALTH)

GRABOVSKIY, L.K., inzh.; BASHILOV, G.N., inzh.; SOKOLOVSKIY, O.P., inzh.; KRASNOSEL'SKIKH, S.N., inzh.; ANTONOV, P.A.; BYKOV, V.A., inzh.; DANILOV, G.G., inzh.; GEL'FENBEYN, Ye.Yu., inzh.; PILIP, M.M., inzh.; MAKAROV, B.V., inzh.; RAGINSKIY, D.M., inzh.

Equipment of a working line of hot rolling mills. Sbor. st. NIITIAZHMASHa Uralmashzavoda no.6:70-96 '65.

(MIRA 18:11)

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031500051-6

MAKAROV, B.V., inzh.

Precast reinforcements for stabilizing slopes of earth structures. Gidr. stroi. 30 no.11:25-27 N '60. (MIRA 13:10)
(Precast concrete) (Soil stabilization)

MAKAROV, B.V.

BONDARYUK, Mikhail Makarovich; IL'YASHENKO, Sergey Mikhaylovich; SHCHETINKOV, Ye.S., doktor tekhn.nauk prof., retsenzent; MAKAROV, B.V., inzh., red.; PETROVA, I.A., izdatel'skiy red.; ROZHIN, V.P., tekhn.red.

[Ram-jet engines] Priamotochnye vozdushno-reaktivnye dvigateli. Moskva, Gos. izd-vo obor. promyshl. 1958. 391 p. (MIRA 11:4)
(Jet planes--Engines)

MAKAROV, B.V.

VARSHAVSKII, G.A., and B.V. MAKAROV.

K voprosu ob opredelenii optimal'nykh uslovil raboty vozdushno-reaktivnogo divgatelia nepreryvnogo deistviia. (Tekhnika vozdushnogo flota, 1940, no.6, p.40-49, diagrs., bibliography)

Title tr.: Determination of optimum conditions of uninterrupted jet engine performance.

SO: AERONAUTICAL SCIENCES AND AVIATION IN THE SOVIET UNION, LIBRARY OF CONGRESS, 1955

MAKAROV, B.P. (Moskva)

Behavior of compressed and bent rods in the elastoplastic stage. Stroi.mekh. i rasch.soor. 7 no.5:3[illegible] '65.

(MIRA 18:10)

ACC NR: AR7004675

The joint probability density of coordinates and speeds satisfies the Fokker-Planck-Kolmogorov equation. The problem of determining the mean time for reaching a boundary in the phase space corresponding to shell snapping is reduced to a boundary value problem for the Pontryagin equation. The region which is "safe", from the standpoint of shell snapping, is determined in the phase space. An approximate expression for the trajectory of a phase point is found by the method of harmonic balance. Yu. N. Novichkov. [Translation of abstract] [DW]

SUB CODE: 20/

Card 2/2

ACC NR: AR7004675 SOURCE CODE: UR/0124/66/000/010/V021/V021

AUTHOR: Makarov, B. P.

TITLE: On the snapping of an elastic shell subjected to random forces

SOURCE: Ref. zh. Mekhanika, Abs. 10V159

REF SOURCE: Dokl. Nauchno-tekhn. konferentsii po itogam nauchno-issled. rabot za 1964-1965 gg. Mosk. energ. in-t. Sekts. energomashinostroit. M., 1965, 275-286

TOPIC TAGS: elasticity theory, elastic shell

ABSTRACT: The snapping of a shell under the action of a stationary random load of the white-noise type is investigated. The application of the Bubnov-Balerkin method to the Foppl-Karman type of equation reduces the problem to a system of ordinary differential equations whose right-hand side is a random function of the white-noise type. (An approximation of the deflection, taking into account only two terms, is studied). It is shown that in this case, the evolution of generalized coordinates and speeds represents a continuous multidimensional Markov process.

Card 1/2

MAKAROV, B.P., kand.tekhn.nauk; CHICHENEV, N.A., inzh.

Snapping of thin elastic panels under the action of random pulsed loads. Rasch,na prochn. no.11:378-384 '65.
(MIRA 19:1)

BOLOTIN, V.V., doktor tekhn. nauk, prof.; MAKAROV, B.P., kand. tekhn. nauk; MISHENKOV, G.V., kand. tekhn. nauk; NAGORNOV, L.N., inzh.; POMAZI, L., aspirant

Some problems of dynamic stability of elastic rings subjected to sudden loading. Izv. vys. ucheb. zav.; mashinostr. no.6: 76-82 '65. (MIRA 18:8)

1. Moskovskiy energeticheskiy institut.

BOLOTIN, V.V. (Moskva); KURANOV, B.A. (Moskva); MAKAROV, B.P. (Moskva)

Oscillations of circular transformer windings. Izv.AN SSSR.Energ.i transp. no.4:86-90 Jl-Ag '65. (MIRA 18:10)

L [illegible] EWT(d)/EWT(l)/EWP(m)/EWT(m)/EWP(w)/EWA(d)/EWP(v)/EPR/EWP(k)/EWA(h)/ [illegible]/EWA(l) Pd-1/Pf-4/Pab/Pi-4 WW/EM

ACCESSION NR: AP5016253 UR/0373/65/000/003/0077/0083

25
B

AUTHORS: Bolotin, V. V. (Moscow); Makarov, B. P. (Moscow)

TITLE: Approximate solution of certain statistical dynamics problems

SOURCE: AN SSSR. Izvestiya. Mekhanika, no. 3, 1965, 77-83

TOPIC TAGS: Markov process, boundary value problem, reliability

ABSTRACT: The authors find an approximate solution of determination of the mean time for attaining the boundary of a multidimensional Markov process by applying the method of Galerkin to Pontryagin's boundary value problem. The accuracy is estimated by comparison with known exact solutions. The problem is of interest in reliability and lifetime fatigue problems. They apply their method to a study of a simplified model of an elastic shell subject to random forces of white noise type. Orig. art. has: 8 figures and 31 formulas.

ASSOCIATION: none

SUBMITTED: 21Dec64 ENCL: 00 SUB CODE: MA

NO REF SOV: 000 OTHER: 000

Card 1/1

KURANOV, B.A., aspirant; MAKAROV, B.P., kand. tekhn. nauk

Stability of multilayer elastic rings under the action of a uniform pressure. Izv. vys. ucheb. zav.; mashinostr. no.8: 49-57 '64. (MIRA 17:11)

1. Moskovskiy energeticheskiy institut.

[illegible] EWT(d)/EWT(1)/EWP(m)/EWT(m)/EWP(w)/EWA(d)/EWP(v)/EPR/EWP(k)/EWA(h)/
[illegible]

BOLOTIN, V.V., doktor tekhn.nauk, prof.; MAKAROV, B.P., kand.tekhn.nauk;
KURANOV, B.A., inzh.

Strength and rigidity of internal transformer windings.
Elektrichestvo no.4:54-58 Ap '64. (MIRA 17:4)

1. Moskovskiy energeticheskiy institut.

where: L - length; n - number of circumferential waves; f_1, f_o - amplitudes of deflection and initial deflection respectively; R - radius; ψ and ξ - parameters of the total energy of the system. It can be seen from the graphs that, depending on the size of the shell and the nature of the imperfections, the maximum density of probability of the critical force may approach the values of the upper and the lower critical forces calculated for perfect shapes.
There are 9 figures.

SUBMITTED: March 15, 1962

Analysis of nonlinear stability... S/258/63/003/001/011/022
E201/E141

where: q_* - upper critical force; $f_1, f_2, \ldots, f_n$ - continuous parameters of initial imperfections. The density of scatter is given by:

$$p(q_*) = \int_{-\infty}^{\infty} \ldots \int_{-\infty}^{\infty} p(\varphi, f_2, \ldots, f_n) \left| \frac{\partial \varphi(q_*, f_2, \ldots, f_n)}{\partial q_*} \right| df_2 \ldots df_n \qquad (3)$$

For a particular imperfection the corresponding equations are:

$$f_1 = \varphi(q_*, f_2, \ldots, f_n) \qquad (2)$$

and

$$p(q_*) = p(\varphi) \left| \frac{\partial \varphi(q_*)}{\partial q_*} \right| \qquad (4)$$

where $p(\varphi, f_2, \ldots, f_n)$ - common density of probability.
The equation for the initial deflection is:

$$w_o = f_o \left(\sin \frac{\pi x}{\alpha} \sin \frac{ny}{R} + \psi \sin \frac{2\pi x}{L} + \xi \right) \qquad (5)$$

Card 2/3

S/258/63/003/001/011/022
E201/E141

AUTHOR: Makarov, B.P. (Moscow)

TITLE: Analysis of nonlinear stability problems of shells by a statistical method

PERIODICAL: Inzhenernyy zhurnal, v.3, no.1, 1963, 100-106

TEXT: This paper is concerned with application of the statistical method developed by V.V. Bolotin (Gosstroyizdat, 1961) to the determination of the stability of imperfect shells. The author considers the influence of imperfections on the upper and lower critical loads in cylindrical shells subjected to axial and hydrostatic loadings and in closed circular cylindrical shells under axial compression, unidirectional pressure and torsion. In the case of a shallow cylindrical panel the author investigates the influence of imperfections of the elastic supports on the behavior of the panel. The problem is to find the distribution of critical forces when the distribution of random imperfections is known. The basic equation is:

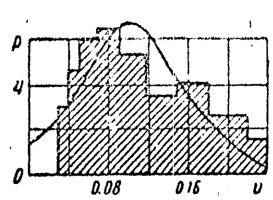
$$q_* = q_* (f_1, f_2, \ldots, f_n) \qquad (1)$$

Card 1/3

normal distribution curve with the mean, $m = 0.1$, and the standard deviation, $\sigma = 0.06$, is plotted. The author stresses that the experimental data available to him are insufficient for drawing any firm conclusions, and that his paper "should be considered only as a first attempt to estimate the character of the distribution of critical stresses and parameters of initial imperfections on the basis of experimental data".
There are 4 figures.

SUBMITTED: October 7, 1961

Fig.4



APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031500051-6

of q_*/q^o_* (q^o_* the upper critical stress for an ideal thin cylinder) for different intervals (0-500, 500-1000, 1000-2000 and 2000-4000) of values of the ratio $r = R/h$ (R - radius, and h - thickness of a thin cylinder) are calculated. Then, using the results of Donnel and Wan (Ref.4), a theoretical curve of the ratio q_*/q^o_* as a function of the parameter u is constructed. This parameter is defined by:

$$u = \zeta_o \frac{h}{R} n^2 m^{\frac{3}{2}} \qquad (5)$$

where ζ_o is the amplitude of initial deflection; n the number of waves in circumferential direction; $m = \ell_s/\ell_x$ the ratio of the length of a circumferential half wave to the length of a longitudinal one. Finally, knowing the experimental distribution of the critical stress and the theoretical relations between the stress and the parameter u, an experimental distribution of u is determined using the usual probability methods. The results of these calculations are presented in Fig.4 in the form of a histogram, on which, for comparison, the

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031500051-6

37147
S/179/62/000/001/022/027
E115/E135

10.6100

AUTHOR: Makarov, B.P. (Moscow)

TITLE: Application of statistical method for analysis of experimental data on stability of thin cylinders

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Mekhanika i mashinostroyeniye, no.1, 1962, 157-158

TEXT: Using experimental data presented in the paper by L.A. Harris, H.S. Suer, W.T. Skene and R.I. Benjamin (Ref.3: J.Aeronaut.Sci., v.24, no.8, 1957) on the critical stresses (q_*) of thin-walled unstiffened circular cylinders under axial compression, and applying some of the theoretical results on the connection between q_* and a parameter u, which characterizes the initial imperfections of thin cylinders (to be defined in the sequel) stated in the paper by L.H. Donnel and C.C. Wan (Ref.4: J.Appl.Mech., v.17, no.1, 1950), the author attempts to find the distribution law of the parameter u from an experimental distribution of q_*. First, using the data of Harris and associates (Ref.3), experimental histograms of the distribution

S/879/62/000/000/063/088
D234/D308

AUTHOR: Makarov, B. P. (Moscow)

TITLE: Application of the statistical method to the analysis of nonlinear problems of stability of shells

SOURCE: Teoriya plastin i obolochek: trudy II Vsesoyuznoy konferentsii, L'vov, 15-21 sentyabrya 1961 g. Kiev, Izd-vo AN USSR, 1962, 363-367

TEXT: The author applies the results of V. V. Bolotin (Izv. AN SSSR, OTN, no. 3, 1958), A. S. Vol'mir (DAN SSSR, v. 113, no. 2, 1957), L. H. Donnel and C. C. Wan (Journ. Appl. Mech., v. 17, no.1, 1950) to three examples (closed cylindrical shell subject to pressure in all directions, or to axial compression: cylindrical panel with imperfectly clamped edges, compressed along straight edges). In the second example experimental results published by other authors are quoted. There are 6 figures.

Card 1/1

$$\lambda^8 + 4g\lambda^7 + a_6\lambda^6 + 3ga_6\lambda^5 + a_4\lambda^4 + 2ga_4\lambda^3 + a_2\lambda^2 + ga_2\lambda + a_0 = 0 \quad (34)$$

are found, where equal partial coefficients of damping are equal, then in the first approximation, μ_* is obtained without consideration of damping, i.e. instead of the polynomial in Eq. (34)

$$\lambda^8 + a_6\lambda^6 + a_4\lambda^4 + a_2\lambda^2 + a_0 = 0 \quad (36)$$

should be investigated. For systems with small damping, ω_* can be interpreted as a dimensionless frequency of flutter. It should be noted that with the increase in numerical order of members in the series of Eq. (32), the amplitude foreseen by the linear theory is decreased. The non-linear system of equations can be, therefore, linearized with respect to two last amplitudes, and after mathematical elaboration equations are deduced for amplitude A. There are 3 figures and 7 Soviet-bloc references.

ASSOCIATION: Moskovskiy energeticheskiy institut (Moscow Power Institute)

SUBMITTED: January 3, 1961

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cal speed. At the same time the results of first and second approximation differ little from each other in the vicinity of critical speed. As can be seen from Fig. 2, a three fold increase of the reduced Mach number μ, with respect to the critical value, results in a 10 % correction of the second approximation. A more precise calculation requires an increase in the number of members in the series. A plate with two sides that are parallel to the flow and clamped, the other two being supported, is then considered with the help of

$$w = \left(1 - \cos\frac{2\pi y}{b}\right)\left[f_1(t)\sin\frac{\pi x}{a} + f_2(t)\sin\frac{2\pi x}{a} + \right. \qquad (32)$$

$$\left. + f_3(t)\sin\frac{3\pi x}{a} + f_4(t)\sin\frac{4\pi x}{a}\right].$$

A system of linear normal differential equations is evolved with dimensionless partial frequencies. To obtain the critical reduced Much number μ_*, it is necessary to determine the value of μ when two imaginary roots and the remainder of negative roots for

$$A = \sqrt{\frac{8 K d_{21} (\mu - \mu_*)}{3 (L d c_0 - K \mu_*^3 b_0)}}, \tag{27}$$

is deduced for the first approximation amplitude. From the first condition of periodicity, and when $g^2 \ll 1$, a correction for amplitude A_1 is obtained from

$$A_1 = A \left[\frac{a_1 d \mu_*^2}{108 d_{12} d_{21} L_0} + (\mu - \mu_*) \left(\frac{3 K \mu^2_* b_0}{2 L_0} - \frac{L_1}{2304 K d_{12} d_{21} L^2_0} \right) \right], \tag{30}$$

In the latter, the first member in the brackets expresses the effect of quadratic aerodynamic members and does not depend upon the speed of flow. The second member corresponds to the cubic members and provides the correction that increases with the rise of the reduced Mach number μ. Computations made for a square pannel demonstrate that the correction of amplitude of first approximation A_1 reaches significant values at speeds that exceed the criti-

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$$\begin{cases} \quad = \Psi_1^{(1)} (A_1, \varphi_{11}, \varphi_{21}, p_1, \mu_1 \mu_*, \tau_1), \\ \omega_*^2 \dfrac{d^2 \zeta_2^{(1)}}{d \tau_1^{(2)}} + g \omega_* \dfrac{d \zeta_2^{(1)}}{d \tau_1} + \omega_2^2 \zeta_2^{(1)} + \mu_* K d_{21} \zeta_1^{(1)} = \\ \quad = \Psi_2^{(1)} (A, \varphi_{11}, \varphi_{21}, p_1, \mu_1 \mu_*, \tau_1). \end{cases} \tag{21}$$

. . . .

$$\begin{cases} \omega_*^2 \dfrac{d^2 \zeta_1^{(s)}}{d \tau_1^2} + g \omega_* \dfrac{d \zeta_1^{(s)}}{d \tau_1} + \zeta_1^{(s)} - \mu_* K d_{12} \zeta_2^{(s)} = \\ \quad = \Psi_1^{(s)} (A, \varphi_{11}, \varphi_{21}, \zeta_1^{(1)}, \ldots \zeta_2^{(s-1)}, p_1, \ldots p_s, \mu_1, \mu_*, \tau_1), \\ \omega_*^2 \dfrac{d^2 \zeta_2^{(s)}}{d \tau_1^2} + g \omega_* \dfrac{d \zeta_2^{(s)}}{d \tau_1} + \omega_2^2 \zeta_2^{(s)} + \mu_* K d_{21} \zeta_1^{(s)} = \\ \quad = \Psi_2^{(s)} (A_1, \varphi_{11}, \varphi_{21}, \zeta_1^{(1)}, \ldots \zeta_2^{(s-1)}, p_1, \ldots p_s, \mu_1, \mu_*, \tau_1). \end{cases} \tag{22}$$

After some mathematical elaboration and by considering $\mu_1 - \mu - \mu_*$

Card 5/9

the righ hand of which is considered as the resulting member. The critical reduced Much number μ_* is calculated from

$$\mu_* = \frac{\omega_2^2 - 1}{2K\sqrt{d_{12}\,d_{21}}} + (Og^2); \quad \omega_* = \sqrt{\frac{\omega_2^2 + 1}{2}} + 0(g^2). \tag{16}$$

Damping in systems that do not have multiple or adjacent frequencies is small; therefore, members containing g above the first power can be neglected. This leads to a set of equations

$$\left\{\begin{aligned} &\omega_*^2 \frac{d^2\varphi_{11}}{d\tau_1^2} + g\,\omega_* \frac{d\varphi_{11}}{d\tau_1} + \varphi_{11} - \mu_* K d_{12}\varphi_{21} = 0,\\ &\omega_*^2 \frac{d^2\varphi_{21}}{d\tau_1^2} + g\,\omega_* \frac{d\varphi_{21}}{d\tau_1} + \omega_2^2\varphi_{21} + \mu_* K d_{21}\varphi_{11} = 0; \end{aligned}\right. \tag{20}$$

$$\omega_*^2 \frac{d^2\zeta_1^{(1)}}{d\tau_1^2} + g\,\omega_* \frac{d\zeta_1^{(1)}}{d\tau_1} + \zeta_1^{(1)} - \mu_* K d_{12}\zeta_2^{(1)} = \tag{21}$$

[illegible]

S/145/61/000/005/001/009
D221/D306

$$+ \varkappa \frac{\varkappa + 1}{12} p_\infty M^3 \left(\frac{\partial w}{\partial x}\right)^3 + \dots, \tag{6}$$

for pressure on the surface subjected to gas flow p. The limit conditions are defined in relation to the type of plate fixing along its edges. The former can be determined with accuracy as far as sag w, is concerned, but it is difficult for Ф. Periodic solution of the system is found by the method of small parameters. For this purpose author considers a certain critical value of the reduced Mach number μ_*, by designating $\mu = \mu_* + \eta\mu_1$, where μ is the reduced Mach number, η is a small parameter, and μ_1 is of the same order as μ. By introducing the small multiplier, η, the author deduces

$$\ddot{\zeta}_1 + g\dot{\zeta}_1 + \zeta_1 - \mu_* K d_{12}\zeta_2 = \eta\mu_1 K d_{12}\zeta_2 - \eta\Psi_1(\zeta_1, \zeta_2, \mu_* + \eta\mu_1),$$

$$\ddot{\zeta}_2 + g\dot{\zeta}_2 + \omega_2^2\zeta_2 + \mu_* K d_{21}\zeta_1 = -\eta\mu_1 K d_{21}\zeta_1 - \eta\Psi_2(\zeta_1, \zeta_2, \mu_* + \eta\mu_1). \tag{15}$$

and

$$\frac{1}{Eh}\Delta^2\nabla^2\Phi = \left(\frac{\partial^2 w}{\partial x\,\partial y}\right)^2 - \frac{\partial^2 w}{\partial x^2}\,\frac{\partial^2 w}{\partial y^2}, \qquad (2)$$

concerning the deformations of plate, where $\Phi(x, y, t)$ is a function which expresses efforts in the central section, as in

$$N_x = \frac{\partial^2 \Phi}{\partial y^2}; \quad N_y = \frac{\partial^2 \Phi}{\partial x^2}; \quad N_{xy} = -\frac{\partial^2 \Phi}{\partial x\,\partial y}, \qquad (3)$$

In the latter I is the cylindrical rigidity, E the modulus of elasticity, and q the normal load. The turbulent pressure at ultrasonic speeds is then given by taking into account the speed of the normal component of flow at the surface of plate v, the speed of sound for non-turbulent gas a_∞, and the index of polytropy . By introducing the Mach number $M = U/a_\infty$, the author writes

$$p = p_\infty + \varkappa p_\infty M\,\frac{\partial w}{\partial x} + \varkappa\,\frac{\varkappa+1}{4}\,p_\infty M^2\left(\frac{\partial w}{\partial x}\right)^2 + \qquad (6)$$

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S/145/61/000/005/C01/009
D221/D306

AUTHOR: Makarov, B.P., Aspirant

TITLE: Amplitudes of steady-state flutter of clamped panels

PERIODICAL: Izvestiya vysshykh uchebnykh zavedeniy. Mashinostroyeniye, no. 6, 1961, 11 - 25

TEXT: The article considers the stability and vibrations of clamped plates in a supersonic gas flow by taking into account geometrical and aerodynamic non-linearity. A rectangular plate with sides a and b (Fig. 1) is subject to supersonic gas flow at speed U, directed along axis Ox. Its normal bending, w(xyt) is assumed to be comparable to its thickness, but is small in relation to a and b. It is also assumed that tangent inertia forces are negligible compared to normal forces of inertia and the hypothesis of straight normals is fulfilled. This leads to

$$D\nabla^2\nabla^2 w = \frac{\partial^2 \Phi}{\partial y^2}\frac{\partial^2 w}{\partial x^2} + \frac{\partial^2 \Phi}{\partial x^2}\frac{\partial^2 w}{\partial y^2} - 2\frac{\partial^2 \Phi}{\partial x \partial y}\frac{\partial^2 w}{\partial x \partial y} + q, \qquad (1)$$

Card 1/9

28264

Stability of choked plates ...

S/145/61/000/001/001/006
D294/D303

3 non-Soviet-bloc. The references to the English language publications read as follows: H. Ashley, C. Zartarian, Pistons theory - a new aerodynamical tool for the aeroelastician, J. Aeronaut. Sci., v.23, 1956, no. 6; I. Hedgepeth, On the flutter of panels at high Mach numbers, J. Aeronaut.Sci., v.23, 1957, no. 6; Y.C. Fung, On two-dimensional panel flutter, J. Aeronaut. Sci., v.25, 1958, no. 3.

ASSOCIATION: Moskovskiy energeticheskiy institut (Moscow Energetics Institute)

SUBMITTED: July 19, 1960

Card 3/3

28164
S/145/61/000/001/001/006
Stability of choked plates ... D294/D303

sonic flow around the plates which have their sides supported parallel with the stream is discussed as well as the problems of flow around the plates having their sides choked parallel with the stream, or such plates which are choked all along their contour. For solving this problem, the author uses the Galerkin method as cited by V.V. Bolotin (Ref. 7: O primenenii variatsionnogo metoda Galerkina k zadacham flattera uprugikh paneley (Application of the Variation Method of Galerkin for Problems of Elastic Panels Flutter), "Izvestiya vysshey shkoly. Mashinostroyeniye", 1959, no. 11). Analyzing rectangular plates freely supported along their entire contour, Galerkin uses the theory of determinants; he proves that in this case determinants converge. This is also applied to plates choked on all sides. Thus, the determinant established by Galerkin belongs to the class of normal (converging) determinants. Graphs are given showing the dependence of plate oscillation frequencies on the Mach number, dependence of this number on parameters of compression charge and on the value of the ratio between the plate sides. There are 7 figures and 9 references: 6 Soviet-bloc and

Card 2/3

28164

S/145/61/000/001/001/006
D294/D303

10.6300

AUTHOR: Makarov, B.P., Aspirant

TITLE: Stability of choked plates in a stream of compressed gas

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Mashinostroyeniye, no. 1, 1961, 3-12

TEXT: In this article, the stability of rectangular flat panels fixed on different supports is analyzed. The relation between the critical speed of flutter and the given parameters (value of compressing forces, ratio of plate sides, coefficient of damping) is determined. In order to establish the surplus aerodynamic pressure, the author uses a linear approximation of asymptotic formulae which is applicable at supersonic speeds. He expresses the pressure P as a function of the following parameters: P - gas pressure on the plate surface; P_∞ - undisturbed gas pressure; v - normal component of stream speed on the plate surface; a_∞ - sound velocity for undisturbed gas; x - polytropic exponent. The problem of super-

Card 1/3

S/124/62/000/012/006/009
D234/D308

Nonlinear flutter ...

length of the plate) the amplitude is of the order of h and the excitation of flutter is soft.
[Abstracter's note: Complete translation]

Card 2/2

44039
S/124/62/000/012/006/009
D234/D308

10.6300

AUTHOR: Makarov, B.P.

TITLE: Nonlinear flutter of a plate clamped along its edge

PERIODICAL: Referativnyy zhurnal, Mekhanika, no. 12, 1962, 27, abstract 12B139 (Tr. Konferentsii po teorii plastin i obolochek, 1960, Kazan', 1961, 220-225)

TEXT: The author investigates the stability of rectangular plane plates clamped along the edge, with one side in a gas stream of large supersonic velocity. The normal deflection is assumed to be comparable with the thickness but small with regard to the length of the sides. Aerodynamic forces are determined on the basis of an asymptotic formula valid for velocities considerably exceeding the velocity of sound. The initial system of equations of motion is reduced to two ordinary differential equations by Galerkin's method. Periodic solutions of these are found by the method of small parameter. The calculations show that for moderate values of μ = Mh/a (M being Mach's number, h the thickness, a the

Card 1/2

in the same way. Four cases are considered next, in which some sides are hinged and other sides rigidly fixed. Values of α computed for these cases for a square plate are tabulated and compared with those obtained by Ritz's method. The authors remark that some formulae for principal frequencies by Ritz's method, given in other publications, also in two reference manuals, contain errors. Equation for β_x of an orthotropic plate is also derived and a table of α for a square plate is given. There are 9 figures, 6 tables and 14 references: 11 Soviet-bloc and 3 non-Soviet-bloc. The reference to the English-language publication reads as follows: K. Friedrichs, Asymptotic phenomena in mathematical physics. Bull. Americ. Math. Soc. 61, no. 6, 1955.

X

is obtained ($\beta_y = 1/\beta_x$), which is reduced to a single transcendental equation for β_x, and β_x is computed by successive approximation the initial value being the asymptotic one β_x = an/bm; the final quantity is the factor $\alpha = (a/\lambda_x)^2 + (a/\lambda_y)^2$. The authors give a table showing successive stages of computation of α for ten lowest frequencies of a square plate, and compare all values with Iguti's results obtained from a series solution satisfying all boundary conditions (six terms of the series taken). The largest difference between the results is 2.53% for m = n = 1. A table of values of α for 16 lowest frequencies of plates with a/b = 0.25 and a/b = 0.50 is also given. The equation for β_x of a plate elastically fixed along all edges is deduced. In this case both β_x and a/λ_x must be found by successive approximation; a graph of values of α as a function of $K = 2\pi D/ac$ (D being the cylindrical rigidity of the plate, c the rigidity factor for the edge) for 10 types of vibration is given. The case of an axially compressed plate is treated

33397

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D224/D304

It is deduced that

$$X(x) = C_1 \sin \frac{\pi x}{\lambda_x} + C_2 \cos \frac{\pi x}{\lambda_x} + C_3 e^{-\frac{\pi x}{\lambda_x}\sqrt{1 + 2\beta_x^2}} \quad (8)$$

$\beta_x = \lambda_x/\lambda_y$. The first two terms correspond to the asymptotic representation for the internal zone; the third describes the dynamic edge effect. Estimation shows that the width of the zone of edge effect does not exceed 1/2 of the wavelength. For a plate with all edges rigidly fixed,

$$\operatorname{tg} \frac{\pi a}{2\lambda_x} = \frac{1}{\sqrt{1 + 2\beta_x^2}}, \quad \operatorname{tg} \frac{\pi b}{2\lambda_y} = \frac{1}{\sqrt{1 + 2\beta_y^2}} \quad (14)$$

33397

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D224/D304

AUTHORS: Bolotin, V. V., Doctor of Technical Sciences, Professor, Makarov, B. P., Mishenkov, G. V. and Schveyko, Yu. Yu., Engineers

TITLE: An asymptotic method of investigating the spectrum of natural frequencies of elastic plates

SOURCE: Raschety na prochnost'; teoreticheskiye i eksperimental'nyye issledovaniya prochnosti mashinostroitel'nykh konstruktsiy. Sbornik statey. No. 6, Moscow, 1960, 231-253

TEXT: The authors consider the natural vibrations of a rectangular plate (with the sides a, b) of constant thickness. The general solution of wave equation near the edge x = 0 is looked for in the form

$$W(x, y) = X(x)\sin\frac{\pi(y - y_0)}{\lambda_y} \qquad (5)$$

Card 1/4

SOV/179-59-3-9/45

Non-linear Problems of Stability of Plane Panels at High Supersonic Velocities

and Yu. R. Shneyder, of the Mathematical Machine Laboratory MEI, for participating in the calculations. There are 6 figures and 9 references, 7 of which are Soviet and 2 English.

SUBMITTED: November 18, 1958

Card 4/4

SOV/179-59-3-9/45

Non-linear Problems of Stability of Plane Panels at High Supersonic Velocities

$\varkappa$ is the polytropy index. The component of load normal to the plate is

$$q = -\rho_o h \frac{\partial^2 w}{\partial t^2} - 2\rho_o h \varepsilon \frac{\partial w}{\partial t} + \Delta p \tag{6}$$

where w is the deflection, ρ_o is the density and h the thickness of the plate, ε is the damping coefficient, and Δp is the excess pressure, which can be expressed in terms of the Mach number and polytropy index by means of Eq (1). The problem then reduces to the investigation of the non-linear equation for the deflection of the plate, which contains q, subject to the boundary conditions. One solution is expressed as a double sine series and is dealt with both by an approximate numerical method, and with the aid of an electronic calculating machine. The results of the calculations for particular cases are shown graphically (Figs 4, 5 and 6), and indicate the existence of flutter in the panel.

Card 3/4 Acknowledgments are expressed to N. I. Chelnokov

SOV/179-59-3-9/45

Non-linear Problems of Stability of Plane Panels at High Supersonic Velocities

stable in relation to sufficiently small disturbances. These solutions can be realised if the elastic system which is subjected to the sub-critical velocity is sufficiently irregular. All real constructions have some irregularities (defects of manufacture, deformations arising from aerodynamic heating, vibrations under the influence of atmospheric turbulence and other non-stationary factors, etc.). Thus in some cases, the critical velocity determined by the linear aeroelastic theory is only a lower limit to the critical velocity for real constructions. In the present paper, the edges of the plate are assumed to be simply supported and elastically restrained against axial displacements; the pressure on the plate is given by:

$$p = p_{\infty} \left(1 + \frac{\varkappa - 1}{2} \frac{v}{a_{\infty}}\right)^{\frac{2\varkappa}{\varkappa - 1}} \qquad (1)$$

where p is the pressure of the unperturbed gas, v is the normal component of surface velocity of the plate, a_{∞} is the velocity of sound in the unperturbed gas and

Card 2/4

SOV/179-59-3-9/45

AUTHORS: Bolotin, V. V., Gavrilov, Yu. V., Makarov, B. P. and Shveyko, Yu. Yu. (Moscow)

TITLE: Non-linear Problems of Stability of Plane Panels at High Supersonic Velocities (Nelineynyye zadachi ustoychivosti ploskikh paneley pri bol'shikh sverkhzvukovykh skorostyakh)

PERIODICAL: Izvestiya Akademii nauk, SSSR, Otdeleniye tekhnicheskikh nauk, Mekhanika i mashinostroyeniye, 1959, Nr 3, pp 59-64 (USSR)

ABSTRACT: The paper is a continuation of previous work (Refs 1 and 6). The question of the stability of plates and shells, exposed to a current of compressed gas, has so far been discussed in terms of a linear representation (Refs 1-5). For sonic flow and for moderate supersonic numbers M this hypothesis is apparently completely justified. However, for larger supersonic velocities, aerodynamic non-linearity becomes very appreciable. As was shown by Bolotin (Ref 5), solutions different from the unperturbed ones appear in aeroelastic problems, allowing for aerodynamic non-linearity, at velocities below the critical value. Among these solutions are some which are

Card 1/4